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UBER TECHNOLOGIES, INC.
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UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SAN FRANCISCO DIVISION

WAYMO LLC,

Plaintiff,

v.

UBER TECHNOLOGIES, INC., OTTOMOTTO LLC; OTTO TRUCKING LLC,

Defendants.

Case No. 3:17-cv-00939-WHA

DEFENDANTS UBER TECHNOLOGIES, INC. AND OTTOMOTTO LLC'S RESPONSES TO COURT'S QUESTIONS 1-2 AND 5-8 FOR FURTHER HEARING ON MOTION TO STRIKE ASSERTED TRADE SECRET NUMBER 96 [CORRECTED]

Date: September 6, 2017
Time: 8:00 a.m.
Ctrm: 8, 19th Floor
Judge: The Honorable William Alsup
Trial Date: October 10, 2017

UNREDACTED VERSION OF DOCUMENT TO BE SEALED

1. With respect to the specific boards at issue, what focal length lens does each side use? At what angles are the boards tilted relative to the road? How do each of these factors affect [redacted]?

Response to Question 1:

Uber's Fuji transmit boards use a focal length of 150 mm. Waymo's GBr3 transmit boards use a focal length of [redacted]. (Dkt. 1399-5 at 167.)

Fuji consists of two optical cavities, with [redacted] boards in each optical cavity. Fuji boards [redacted] are housed in a medium-range optical cavity that is tilted downward negative 12 degrees. Fuji boards [redacted] are in a long-range optical cavity that has a 0 degree tilt. By contrast, all [redacted] boards of GBr3 are housed within one optical cavity, which is [redacted].

The focal length partially determines the curvature of the focal plane (Petzval surface) along which the diodes are positioned. The different focal lengths of Fuji and GBr3 mean that the Petzval surface curvature is different, and the diodes will be placed along those different curved Petzval surfaces. Changing the focal length changes the x, y coordinates of where the laser diodes need to be positioned to achieve the desired beam angles. The tilt of the boards will affect how the diodes must be placed to achieve the desired beam angles projecting from the sensor. For instance, if the desired beam angle is 0 degrees (parallel with the roadway) and the board has a 0-degree tilt, then the emitting diode would be placed on the center horizontal axis of the Petzval curve. If the desired beam angle is 0 degrees and the board has a [redacted] tilt, then the emitting diode would be placed [redacted] on the Petzval curve, [redacted] from the center horizontal axis.

2. Provide graphs that compare each side's [redacted] on the boards at issue (both facing the same way with the lens to the right) by plotting the actual *x* and *y* [redacted]. Be sure to show all [redacted], not just the overall curves. Be prepared to overlay the plots via computer animations (both with and without "scaling") at the hearing. With respect to any scaling in said animations, if the *y* axis is scaled up (or down) for one side's [redacted], then the *x* axis for that same side's [redacted] must also be scaled up (or down) by that same proportion.

Response to Question 2:

Page 19 of Exhibit A plots the actual x and y positions of the diodes and compares the diode positions of the boards at issue, i.e., Fuji board [redacted] and GBr3 board [redacted] For reference, Uber

also includes comparisons of all [redacted] Fuji boards to GBr3 board [redacted] of trade secret 96, on pages [redacted] of Exhibit A.

Page 26 of Exhibit A overlays the plot for Fuji board [redacted] on top of the plot for GBr3 board [redacted] by aligning the top diodes of the two boards so that they are at the same x and y positions. Neither plot is scaled. For reference, Uber also includes comparisons of all [redacted] Fuji boards to GBr3 board [redacted] on pages [redacted] of Exhibit A.

The plots of the Fuji diodes were created by using the x, y coordinates from UBER00151175, previously filed as Dkt. 174-3, using the coordinates for the emitting point referenced from the fiducial. The plots of the GBr3 diodes were created by using the x, y coordinates from WAYMO-UBER-00003220 at 3235, previously filed as Dkt. 25-8.

5. Provide graphs for each side's LiDAR design that show the self-driving car and the roadway, and plot the [redacted] in each board.

Response to Question 5:

A graph of Fuji's overall 64-beam pattern can be found on page 1 of attached Exhibit B. A graph of the beam pattern from Fuji board C can be found on page 4 of Exhibit B. For reference, Uber also includes the beam patterns from all [redacted] Fuji boards on pages [redacted] of Exhibit B.

A graph of GBr3's overall beam pattern can be found on page 9 of Exhibit B. A graph of the beam pattern for GBr3 board [redacted] of trade secret 96 can be found on page 10 of Exhibit B.

A comparison of Fuji's overall beam pattern with GBr3's overall beam pattern is made on page 12 of Exhibit B (with a panned out view on page 13 and a close-up view on page 14). As shown on these graphs, the beam pattern is significantly different between Fuji and GBr3. In addition, a comparison of the beam patterns for Fuji board [redacted] and GBr3 board [redacted] can be found on page 17 of Exhibit B. For reference, Uber also includes a comparison of the beam patterns of all [redacted] Fuji boards to GBr3 board [redacted] on pages [redacted] of Exhibit B.

The beam pattern of Fuji was created by using the beam angles from UBER00151175. (Dkt. 174-3.) The beam pattern of GBr3 was created by using the theta values from WAYMO-UBER-00003220 at 3235 to derive the beam angles (as explained in the response to

Question 7 below). (Dkt. 25-8.)

As an independent point of reference, Uber also provides beam patterns for the commercially available Velodyne HDL-64. This graph can be found on page 22 of Exhibit B. A comparison of Fuji's beam pattern to the Velodyne HDL-64 is shown on page 24 of Exhibit B.

The beam pattern of GBr3 is compared to that of the Velodyne HDL-64E on page 26 of Exhibit B (a close-up appears on page 27).

6. Also compare and discuss any similarities or differences between other boards in each side's LiDAR design.

Response to Question 6:

As stated above, Fuji consists of two optical cavities, with [redacted] boards in each optical cavity. Fuji boards [redacted] are in a medium-range optical cavity that is tilted downward negative 12 degrees. Fuji boards [redacted] are in a long-range optical cavity that has a 0 degree tilt. In addition, boards [redacted] in the long-range optical cavity have nearly uniform spacing between the laser diodes, as shown on pages [redacted] of Exhibit A. The [redacted] boards in the long-range optical cavity have different beam spacings than the boards in the medium-range optical cavity. (*Compare* pages [redacted] of Exhibit B, *with* pages [redacted]) Moreover, the boards in the long-range optical cavity are positioned upside down, which needs to be reflected in the theta values of the Fuji diodes for those boards.

By contrast, all [redacted] of GBr3 boards are in one optical cavity, and all [redacted] boards exhibit [redacted]. (See pages [redacted] of Exhibit A.)

[redacted]

Aside from the diode location and beam angles, there are numerous other differences between GBr3 board [redacted] and Fuji transmit boards, including [redacted]. Some exemplary differences are illustrated above. For example, GBr3 board [redacted], and Fuji does not. In addition, the GBr3 board [redacted], whereas Fuji's [redacted]. The [redacted], whereas the curve of the Fuji board is [redacted] The arrangement of [redacted] in the GBr3 board [redacted] and [redacted] in the Fuji board are also different. In addition, the laser diodes in the GBr3 board [redacted] are [redacted] than Fuji's diodes, which are [redacted]. Moreover,

GBr3 board [redacted] and the Fuji board have [redacted].

These differences further demonstrate that Uber did not use GBr3 board [redacted]

7. How should the theta values for each side's [redacted] be compared?

Response to Question 7:

The theta values for Fuji and GBr3 need to be adjusted to account for: (1) sign conventions resulting from the method by which theta angles are recorded in the specification and (2) the tilt of the optical cavity containing the board. As stated above, Fuji board C is in a medium-range optical cavity that is tilted downward negative 12 degrees. GBr3 board [redacted] however, is [redacted].

In the table below, GBr3 theta values were obtained from WAYMO-UBER-00003220 at 3235. (Dkt. 25-8.) Fuji theta values were obtained from UBER00151175, using the thetas referenced for the emitting point from the fiducial. (Dkt. 174-3.) Both GBr3 and Fuji theta values were first multiplied by negative one, so as to result in a negative value for downward-facing beams and a positive value for upward-facing beams. The theta values were then adjusted for the tilt of the optical cavity by [redacted] from the GBr3 theta value and negative 12 from the Fuji theta value.

Once adjusted, the theta values will match the desired beam angles for those lasers, and these adjusted theta values can be compared directly with one another. The adjusted theta values for both GBr3 board [redacted] and Fuji board [redacted] are shown below in the highlighted columns. The beams emitting from these GBr3 and Fuji laser diodes are shown on pages 1 (Fuji), 9 (GBr3), and 12 (comparison of Fuji and GBr3) of attached Exhibit B.

[redacted]

8. Provide an overlay graph that compares each side's [redacted] by aligning the [redacted] on one end of Uber's board with the corresponding [redacted] on one end of Waymo's board, and the [redacted] on the other end of Uber's board with the [redacted] diode on the other end of Waymo's board. Scale the y and x axes (for one board) by the same proportions as needed to achieve these alignments and show where [redacted] then fall. The purpose of this overlay is to account for the [redacted] issue.

Response to Question 8:

See pages 31-34 of Exhibit A. Page 31 compares Fuji board [redacted] which contains [redacted] diodes, with GBr3 board [redacted] which contains [redacted] diodes, by aligning the [redacted] of the two boards and scaling GBr3 as necessary so that [redacted] of Fuji aligns with [redacted] of GBr3 to have the same y-axis coordinates. Similarly, page 32 [redacted] of the two boards and scales GBr3 as necessary so that [redacted] of Fuji aligns with [redacted] of GBr3 to have the same y-axis coordinates. For reference, Uber also includes comparisons of Fuji board [redacted] the other Fuji board containing [redacted] diodes, to GBr3 board [redacted] of trade secret 96 on pages 33 and 34 of Exhibit A.

Dated: September 5, 2017

MORRISON & FOERSTER LLP

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